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Ioana Cozmuta

Summary of Qualifications

- Solid background in Applied and Environmental Physics, Biophysics, Nanoscience, Material Science, Diffusive Transport, Properties of Porous Media, Radioactivity, Molecular Modeling, Polymeric Membranes, Thermodynamics
- Extensive experience in data analysis, conducting research and presenting results
- Proficient in C, Fortran, Matlab, Mathematica, Perl, C-shell; Unix and Windows operating systems
- Molecular modeling programs: Cerius2, InsightII, Amber, NAMD, VMD
- Organized, creative, adaptive, reliable, responsible, highly energetic, good leadership and oral/written communication skills
- Native speaker of Romanian, proficient in English, Dutch and German, seven years high school French

Education

Eloret Corporation, NASA AMES Research Center Moffett Field, CA 2003-present

- Research Scientist, Division of Nanotechnology

Stanford University, Palo Alto, CA 2002-2003

- Post-doctoral Scholar, Biochemistry Department, School of Medicine
- Advisor: prof. R. W. Davis

California Institute of Technology, Pasadena, CA 2001-2002

- Post-doctoral Scholar, Material and Process Simulation Center
- Advisor: prof. W. A. Goddard III

Institute of Nuclear Physics, KVI Groningen, NL 1997-2001

- Ph.D., Applied and Environmental Physics, Nuclear Geophysics Division
- Thesis title: “Radon generation and transport, a journey through matter”
- Advisor: prof. R.J. de Meijer and dr. E. R. van der Graaf

Babes Bolyai University Cluj, Romania 1995–1996

- MS in Biophysics and Medical Physics
- Advisor: prof. C. Cosma

Babes Bolyai University Cluj, Romania 1991-1995

- BS in Physics

Additional education

- Attended the “Accelerator Physics” course at CERN, Geneva, Switzerland
- Attended four sessions of the FANTOM school in Tecklenburg (Germany), Gent (Belgium), Ameland (The Netherlands), Egmond aan Zee (The Netherlands)
- Attended the workshop “Nonlinear Flow and Transport Processes in Porous Media, Delft (The Netherlands)

Research Experience

ELORET Corporation Moffet Field, CA 03/2003-present

Research Scientist, Contractor at NASA AMES Research Center

- Development and application of new computational modeling capabilities for the study of transport of nucleic acids through nanoporous materials. The modeling of ionic currents and nucleic acid polymer translocation will be correlated to the experimental observations to recommend modifications in the process of nanofabrication of biosensors for ultra-fast DNA sequencing. The primary goal of these simulations is to examine the influence of various amino-acid sequence compositions in nanopore walls on the transport of nucleic acid polymers, to determine possible energy barriers experienced by the ions and nucleic acid polymers inside the nanopore and examine the role of barrier fluctuations due to the thermal motion.

- Software development for custom analysis of hybridization data from high-density oligonucleotide arrays.

Stanford University Palo Alto, CA 05/2002-03/2003

Post-doctoral scholar in the School of Medicine, Department of Biochemistry

- Researches the geometry and composition of the alpha hemolysin protein channel, structural and transport properties of aqueous electrolyte solutions and nucleic acid polymers in nanometer sized channels to enhance detection of nucleic acids passing through the nanopore.

- Participated in bio-informatics projects for analysis of hybridization data from high-density oligonucleotide arrays.

California Institute of Technology Pasadena, CA 04/2001-05/2002

Post-doctoral scholar at the Material and Process Simulation Center

- Modeling at atomistic scale of the properties of clay-polymer nanocomposites and study of various aspects of the interactions between the mineral and the organic part. Prediction of X-ray structure of various minerals, calculation of surface energies for unhydrated and hydrated mica and montmorillonite, study of the variation of the gallery height as function of various surfactant properties.
- Development of force field parameters based on quantum mechanics calculations using various methods (density functional theory, Hartree-Fock, LMP2).
- Modeling of wax formation in the process of oil extraction by applying the classical theory of nucleation to determine the size of the critical wax nucleus. Calculations of entropies, enthalpies and free energies and of various structural parameters (gauche-trans distributions, order parameters) are employed. Modeling will help understand the changes induced in the wax formation process by various polymeric inhibitors

California Institute of Technology Pasadena, CA 02/2000 – 03/2001

Visitor at the Material and Process Simulation Center

- Development of a method to calculate permeability (diffusion coefficients and solubilities) with respect to various solutes of polymeric membranes using Molecular Dynamics and Monte Carlo techniques.
- This method was also adapted to allow the estimation of barrier properties with respect to radon.

Institute of Nuclear Physics, KVI Groningen, NL 1997–03/2001

Research Assistant

- Investigation of various methods for inhibiting the radon release from building materials: surface covering and/or design of low-radon emanating building materials
- Measurements of radon release rates from concrete, concrete components and other building materials. This measurement technique also involves the use of gamma-ray detectors
- Study of various related physical (diffusion coefficient, emanation factor, moisture content) or structural (porosity, pore-size distribution, moisture profiles) parameters via experiments or computer simulations

(Pascal code to model radon transport, RadMod)

- Improvement of the radon release rate measurement technique and the corresponding calculational procedure
- Design, optimization, calibration and testing of two methods to measure the radon diffusion coefficient in building materials (analytical solution of the diffusion equation with homogeneous Dirichlet and mixed boundary conditions for a rectangular and cylindrical geometry) and of a setup to measure low porosities
- Supervising the activity of students and visitors from other labs in this field.

Concrete Laboratory Tokyo, Japan 1998 – 2001

Internet collaboration

- Improvement of a numerical Fortran code for simulation of concrete microstructure (DuCOM) developed by Prof. K. Maekawa. This numerical code (DuCOM) and the theoretical model on which it is based were used to model concrete's microstructure and coupled with the radon transport model (RadMod) to simulate the time/moisture dependent radon release, providing a powerful tool for the design of concrete with a low-radon production.

University of Texas at Austin Austin, TX September 1998

Visitor at the Department of Civil Engineering

- Collaboration with Prof. D. Fowler and Dr. R. Corsi on aspects of concrete structure and absorptive properties of solid surfaces.

Environmental Protection Agency Baia Mare, Romania 1996–1997

Environmental Physicist

- Independently conducted pioneering research on pollution aspects (radioactive and non-radioactive pollutants) and study of possible correlations
- Setup and calibration of the detectors in a mobile lab to measure the levels of various pollutants and meteorological parameters of the atmosphere.

Babes Bolyai University Cluj, Romania October 1995

Co-organizer of the Medical Physics European Conference

- Succeeded in obtaining funding from industry; edited the proceedings and other administrative work.

Professional Activities

- The Nanotechnology Conference, Nanotech 2004, **oral presentation**, Boston, MA, March 20004.
- Biophysical Society 48th meeting, **oral presentation**, Baltimore, MD, February 2004.
- DARPA PI meeting, **oral and poster presentation**, Monterey, CA, September 2003.
- IEEE Conference, **oral presentation**, San Francisco, CA, August 2003.
- DARPA PI meeting, **poster presentation**, Santa Barbara, CA, February 2003.
- DARPA PI meeting, **poster presentation**, Portland, OR, August 2002.
- California Institute of Technology**, oral presentation**, MSC 2001 Annual Conference, 29-30 March 2001.
- California Institute of Technology**, oral presentation**, MSC 2001 Annual Conference, 23-24 March 2000
- Technical University of Athens, Greece, **keynote presentation**, ERRICA Workshop "Radon in the living environment", 19-23 April 1999.
- AARST International Radon Symposium**, oral and poster presentation**, NJ, 14-16 September 1998
- North University of Baia Mare, Romania, **oral presentation**, EVRIKA National Physics Conference, December 1996.
- International Radiation Protection Agency Conference**, oral presentation**, Warsaw, Poland, September 1996.
- International Radiation Protection Agency Conference, **oral presentation,** Portoros, Slovenia, September 1995.

Publications

I. Cozmuta, J. T. O'Keeffe, D. Bose and Viktor Stolc, *Hybrid MD-Nernst Planck model of α-hemolysin conductance properties,* submitted to "Molecular Simulations".

I. Cozmuta, J. T. O'Keeffe and Viktor Stolc, *Molecular dynamics approach to calculate α-hemolysin ion currents,* Proceedings of the Biophysical Society Meeting, Baltimore, MD, 2004.

I. Cozmuta, J. T. O'Keeffe, D. Bose and Viktor Stolc, *Hybrid MD-PNP simulations of the α-hemolysin open channel ionic current,* Proceedings of the Nanotech 2004 conference, Boston, MA, 2004.

I. Cozmuta, A. Strachan, M Blanco and W. A. Goddard III, *Exfoliation of montmorillonite for clay nanocomposites"*, to be submitted to the Journal of Physical Chemistry.

I. Cozmuta, A. Strachan, M Blanco and W. A. Goddard III, *Gas sorption and Barrier Properties of Polymer Membranes from MD and MC simulations*, to be submitted to the Journal of Physical Chemistry.

I. Cozmuta, E.R. van der Graaf and R. J. de Meijer, *Moisture Dependence of Radon Transport in Concrete: Measurements and Modeling*, Health Physics, vol. 85, no. 104, October 2003.

I. Cozmuta, M. Brock, J. T. O'Keeffe and Viktor Stolc, *Nanopore sensors for detection and analysis of biological polymers,* DARPA PI meeting, Monterey, CA, September 2003.

I. Cozmuta, J. T. O'Keeffe and Viktor Stolc, *Towards an MD simulation of ion currents in the alpha hemolysin channel,* IEEE, San Francisco, CA, August 2003.

I. Cozmuta, J. T. O'Keeffe and Viktor Stolc, *Ionic signature of the alpha hemolysin channel,* DARPA PI meeting, Santa Barbara, CA, February, 2003.

I. Cozmuta and Viktor Stolc, *Ionic signature of Nanopores,* DARPA PI meeting, Portland, OR, August 2002.

I. Cozmuta, E.R. van der Graaf, *Modeling radon transport in concrete*, Proceedings of the MSC 2001 Conference, Caltech, Pasadena, CA, 29-30 March 2000.

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Radon reduction by surface covering: a new approach*, KVI Annual Report 2000, Groningen, The Netherlands.

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Moisture dependence of the radon diffusion coefficient of concrete*, KVI Annual Report 2000, Groningen, The Netherlands.

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Modeling concrete's structural parameters*, KVI Annual Report 1998, Groningen, The Netherlands.

I. Cozmuta, E.R. van der Graaf, *Aspects of radon transport in concrete*, Proceedings of the MSC 2000 Conference, Caltech, Pasadena, CA, 23-24 March 2000.

I. Cozmuta, E.R. van der Graaf, *Methods for measuring diffusion coefficients of radon in building materials*, *Science of the Total Environment, May 2001, vol. 272, no. 1-3, pp: 323-335.*

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Experimental study on the moisture dependence of radon-release rates of concrete*, KVI Annual Report 1999, Groningen, The Netherlands.

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Concrete composition and radon release*, KVI Annual Report 1999, Groningen, The Netherlands.

I. Cozmuta, E.R. van der Graaf, *Effects of surface covering on radon exhalation rates from concrete*, Proceedings of the AARST International Radon Symposium, 14-16 September 1998, Cherry-Hill, NJ.

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Measurement of radon diffusion coefficient in concrete using a cylindrical geometry*, KVI Annual Report 1998, Groningen, The Netherlands.

I. Cozmuta, E.R. van der Graaf, R.J. de Meijer, *Radon exhalation of building materials: effect of surface covering*, KVI Annual Report 1997, Groningen, The Netherlands.

I. Cozmuta and J. Ferenczi, *Radioactivity, a geological chronometer*, Proceedings of EVRIKA National Physics Conference, Baia Mare, Romania, 1996.

Additional Publications

- J. T. O'Keeffe, I. Cozmuta and Viktor Stolc, *Polymer translocation through a nanopore: a geometry dependence study,* IEEE, San Francisco, CA, August 2003.
- E.R. van der Graaf, I. Cozmuta et all, *Moisture dependence of radon exhalation from concrete*, Proceedings of the Third Euro Symposium on Protection against Radon, Liege, Belgium, 21-25 April, 2001.
- E.R. van der Graaf, I.Cozmuta, R.J. de Meijer, *Dutch intercomparison of radon-exhalation measurements*, KVI Annual Report 2000, Groningen, The Netherlands.
- E.R. van der Graaf, I.Cozmuta, R.J. de Meijer, *Design and calibration of a porosimeter for large samples*, KVI Annual Report 2000, Groningen, The Netherlands.
- E.R. van der Graaf, I. Cozmuta et all, *Aspects of Radon in Dutch Building Practice*, Proceedings of the International Building Physics Conference, Eindhoven, The Netherlands, 18-21 September, 2000.
- E.R. van der Graaf, I.Cozmuta, R.J. de Meijer, *ERRICCA radon-model intercomparison*, KVI Annual

Report 1999, Groningen, The Netherlands.
- E.R. van der Graaf, I.Cozmuta, R.J. de Meijer, *ERRICCA radon-release rate intercomparison*, KVI Annual Report 1999, Groningen, The Netherlands.
- C.Edsfelt, I.Cozmuta, E.R. van der Graaf, *Radium distribution in soils, analyzed with sequential extraction, and its effect on radon emanation*, KVI Annual Report 1998, Groningen, The Netherlands.
- C.Cosma, A.Zeriu, I.Cozmuta, C.Micu, *Bioindicators of environmental radioactive contamination*, Proceedings of IXth Conference of Medical Physics, Trieste, Italy, 1996.
- C.Cosma, A.Zeriu, I.Cozmuta, C.Micu, *Some natural indicators of radioactive pollution*, Proceedings of IRPA Conference, Warsaw, Poland, September 1996.
- C.Cosma, I.Pop, I.Cozmuta, C.Micu, S.Ramboiu, *Some aspects of Cesium deposition in Transilvania/Romania*, Proceedings of the IRPA Conference, Portoros, Slovenia, September 1995.